

Chain Rule

$$f \circ g(x) = f(g(x))$$

$$[f(g(x))]' = f'(g(x)) \cdot g'(x)$$

$$\frac{d}{dx} \left(\frac{1}{5x+3} \right) = \frac{-5}{(5x+3)^2} \quad \left[\begin{array}{l} \text{quotient rule} \\ \& \text{Bob's memory} \end{array} \right]$$

$$\frac{d}{dx} \left[(5x+3)^{-1} \right] = \frac{-1}{(5x+3)^2} (5)$$

$$x \mapsto \frac{5x+3}{f(g(x))} \xrightarrow{-1} (5x+3)^{-1}$$

$f = x^{-1}; f' = -\frac{1}{x^2}$
 $g = 5x+3; g' = 5$

3.5 examples

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3.5 examples

$$\frac{d}{dx} \left(\frac{1}{(5x-3)} \right) = \frac{-5}{(5x-3)^2}$$

$$\textcircled{QP} \quad \frac{(0)(5x-3) - (1)(5)}{(5x-3)^2}$$



2010-10-04 Pd 3



Chain Rule $f \circ g(x) = f(g(x))$



$$(f(g(x)))' = f'(g(x)) \cdot g'(x)$$

$$\begin{aligned} \frac{d}{dx} \left(\frac{1}{5x-3} \right) &= \frac{d}{dx} (5x-3)^{-1} && \begin{cases} f = x^{-1} \\ f' = -x^{-2} = -\frac{1}{x^2} \\ g = 5x-3 \\ g' = 5 \end{cases} \\ &= \frac{-1}{(5x-3)^2} (5) \\ &= \frac{-5}{(5x-3)^2} \end{aligned}$$

3.5 examples

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$$\frac{d}{dx} (\sin x \cdot \cos x)$$

$$\frac{d}{dx} \left(\underbrace{\sin}_{f} \left(\underbrace{\cos x}_{g} \right) \right)$$

$$\overset{f'}{\cos}(\overset{g}{\cos x}) \cdot (\overset{g'}{-\sin x})$$



3.5 examples

2010-10-04 Pd 3

